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09/472,263	12/27/1999	PAUL H. STALLINGS	31408-10229	8507

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EXAMINER	
DAY, HERNG DER	

ART UNIT	PAPER NUMBER
2128	23

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/472,263	Applicant(s) STALLINGS ET AL.	
	Examiner Herng-der Day	Art Unit 2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5,7,8,11-16,18 and 22-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5,7,8,11-16,18 and 22-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 December 1999* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to Applicants' Amendment (paper # 18) to Office Action dated August 13, 2003 (paper # 11), mailed December 11, 2003, and received by PTO December 15, 2003.

1-1. Claims 2, 5, 15, and 18 have been amended; claims 4, 6, 9-10, 17, and 19-21 have been cancelled; claims 26-27 have been added; claims 1-3, 5, 7-8, 11-16, 18, and 22-27 are pending.

1-2. Claims 1-3, 5, 7-8, 11-16, 18, and 22-27 have been examined and rejected.

Oath/Declaration

2. The new declaration submitted March 22, 2004, is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP § 602.01 and 602.02.

The declaration is defective because the signature of inventor Paul R. Stallings matches neither the printed name nor the inventor name on the record, which is Paul H. Stallings.

Drawings

3. The Draftsperson has objected to the drawings. When the application is allowed, Applicants will be required to submit formal drawings.

Abstract

4. The Examiner has acknowledged without objection that the abstract has been amended.

Specification

5. The Examiner thanks Applicants' submitting of the user's manual of ACIS 5.0 and the information regarding optional husks. It has been placed in the application file.

6. Applicants have canceled claims 9, 10, 20, and 21. The objection to the specification in section 6 of paper # 11 for introducing new matter has been withdrawn.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1-25 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

For example, the transformation function f as defined in line 18 of page 9 in the substitute specification is in a form of a 1 x 3 vector. However, the composition of functions f and s1 is in a form of a 3 x 1 vector. The composition of functions f and c1 is also in a form of a 3 x 1 vector. They are contradictory to the example shown in lines 8-9 of page 9. Without undue experimentation, it is unclear how one skilled in the art may obtain the composed functions sf1 and cf1, as shown in line 21 of page 9 and line 7 of page 10, which are 3 x 1 vectors.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

10. Claims 1-2, 7-8, 11-15, and 22-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Silva et al., U.S. Patent 6,184,901 issued February 6, 2001 and filed December 31, 1997.

10-1. Regarding claim 1, Silva et al. disclose a method for using surface and curve functions and positions in a CAD model to define the geometry of a shape to allow the transformation of the shape with a function, said method comprising the steps of:

Obtaining a solid model containing one or more faces, edges and/or vertices, where the underlying geometry of each face, edge or vertex may be represented, respectively by a surface, curve, or position, and each surface or curve may be represented by a function mapping from a domain space into 3-dimensional space (master object 210, column 11, lines 16-19);

Defining a transformation function mapping from 3-dimensional space to 3-dimensional space (modifier stack 280, column 11, lines 16-36);

Creating new surface and curve functions by performing function composition with each of the existing surface and curve functions with the transformation function (derived object 270 is asked by the application control 200 to provide a renderable description of itself, column 11, line 60 through column 12, line 19);

Creating new surfaces and curves by taking each point in the domain of each of the original surface and curve functions and passing the point through the corresponding new function, and creating new positions by passing each original position through the transformation function (derived object representation 246, column 11, lines 47-49); and

Resetting the geometry of the CAD model (rendering, column 11, lines 49-59).

10-2. Regarding claim 2, Silva et al. disclose a method for transforming the geometry of a solid model with a transformation function, comprising the steps of:

providing a solid modeler (3D Studio Max™, column 4, lines 19-20);

obtaining a solid model having a topology and a geometry corresponding to said topology, said geometry comprising one or more surfaces or curves, each surface or curve defined by a function (master object 210, column 11, lines 16-19);

defining a transformation function (modifier stack 280, column 11, lines 16-36); and

transforming the geometry of the solid model by composing each function of said geometry with said transformation function (derived object 270 is asked by the application control 200 to provide a renderable description of itself, column 11, line 60 through column 12, line 19).

10-3. Regarding claim 7, Silva et al. further disclose comprising the step of displaying the solid model after the step of transforming the geometry (on display device 130, column 11, lines 56-59).

10-4. Regarding claim 8, Silva et al. further disclose comprising the step of storing said solid model after the step of transforming the geometry (display buffer 260, column 11, lines 56-59).

10-5. Regarding claim 11, Silva et al. further disclose the transformation function defines a non-linear transformation (Twist, column 8, lines 1-6).

10-6. Regarding claim 12, Silva et al. further disclose the transformation function defines a bend transformation (Bend, column 7, lines 47-50).

10-7. Regarding claim 13, Silva et al. further disclose the transformation function defines a stretch transformation (EditSpline, column 8, lines 23-25).

10-8. Regarding claim 14, Silva et al. further disclose the transformation function defines a twist transformation (Twist, column 8, lines 1-6).

10-9. Regarding claim 15, Silva et al. further disclose a method for transforming a solid model using a generalized transformation function mechanism, comprising the steps of:

providing a computer aided design system adapted to display a solid model (Display Device 130, Figure 1) and having a transformation component adapted to transform said solid model using a transformation function (Tube Modifier Stack 199, Figure 1);

obtaining said solid model, wherein said solid model has a geometry and a topology, said geometry comprising one or more surfaces or curves, each surface or curve defined by a function (master object 210, column 11, lines 16-19);

displaying said solid model (tube 300, column 12, lines 32-39);

obtaining a transformation function (object space modifier 220, column 11, lines 22-23);

operating said transformation component to transform the geometry of said solid model by composing the functions of the geometry with said transformation function (derived object 270 is asked by the application control 200 to provide a renderable description of itself, column 11, line 60 through column 12, line 19);

displaying the solid model after the geometry has been transformed with said transformation function (on display device 130, column 11, lines 56-59); and

storing said solid model after the geometry has been transformed with said transformation function (display buffer 260, column 11, lines 56-59).

10-10. Regarding claim 22, Silva et al. further disclose the transformation function defines a non-linear transformation (Twist, column 8, lines 1-6).

10-11. Regarding claim 23, Silva et al. further disclose the transformation function defines a bend transformation (Bend, column 7, lines 47-50).

10-12. Regarding claim 24, Silva et al. further disclose the transformation function defines a stretch transformation (EditSpline, column 8, lines 23-25).

10-13. Regarding claim 25, Silva et al. further disclose the transformation function defines a twist transformation (Twist, column 8, lines 1-6).

10-14. Regarding claim 26, Silva et al. further disclose the step of transforming the geometry of the solid model by composing said transformation function with each function of the geometry further comprising the steps of:

creating new surfaces, curves and positions by composing each surface, curve and position function of the geometry with said transformation function (derived object 270 is asked

by the application control 200 to provide a renderable description of itself, column 11, line 60 through column 12, line 19); and

resetting the geometry of said solid model to said new surfaces, curves and positions (rendering, column 11, lines 49-59).

10-15. Regarding claim 27, Silva et al. further disclose the step of operating said transformation component to transfer the geometry of said solid model by composing the functions of the geometry with said transformation function further comprising the steps of:

operating the transformation component to create new surfaces, curves and positions by composing each surface, curve and position function of the geometry with said transformation function (derived object 270 is asked by the application control 200 to provide a renderable description of itself, column 11, line 60 through column 12, line 19); and

operating the transformation component to reset the geometry of said solid model to said new surfaces, curves and positions (rendering, column 11, lines 49-59).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 3, 5, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silva et al., U.S. Patent 6,184,901 issued February 6, 2001 and filed December 31, 1997, in view

of Kalay, "Modeling Polyhedral Solids Bounded by Multi-Curved Parametric Surfaces", Proceedings of the Nineteenth Design Automation Conference, 1982, pages 501-507.

12-1. Regarding claims 3 and 5, Silva et al. disclose the master object 210 includes a parametric definition of an instance of a subclass of Object (e.g. the topology and geometry) in column 11, lines 16-19. Although Silva et al. suggest, for example, the topology may comprise mesh and direction of faces and the geometry may comprise vertices and edges, Silva et al. fail to expressly disclose: (1) the topology comprises one or more faces, edges and vertices; and (2) the correspondence between the geometry and the topology.

Kalay proposes a hierarchical representation of shape data for modeling solids bounded by curved surfaces in Figure 4-1. Specifically, Kalay discloses:

(Claim 3) the topology comprises one or more faces, edges and vertices (Kalay, FACES, EDGES, VERTICES, Figure 4-1);

(Claim 5) each surface in the geometry corresponds to a face in the topology, each curve in the geometry corresponds to an edge in the topology and each position in the geometry corresponds to a vertex in the topology (Figure 4-1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Silva et al. to incorporate the teachings of Kalay to obtain the invention as specified in claims 3 and 5 because Kalay discloses in detail the topology, the geometry, and their relationship as suggested by Silva et al. (Silva, column 11, lines 16-19).

12-2. Regarding claims 16 and 18, Silva et al. disclose the master object 210 includes a parametric definition of an instance of a subclass of Object (e.g. the topology and geometry) in column 11, lines 16-19. Although Silva et al. suggest, for example, the topology may comprise

mesh and direction of faces and the geometry may comprise vertices and edges, Silva et al. fail to expressly disclose: (1) the topology comprises one or more faces, edges and vertices; and (2) the correspondence between the geometry and the topology.

Kalay proposes a hierarchical representation of shape data fir modeling solids bounded by curved surfaces in Figure 4-1. Specifically, Kalay discloses:

(Claim 16) topology comprises one or more faces, edges and vertices (Kalay, FACES, EDGES, VERTICES, Figure 4-1);

(Claim 18) each surface in the geometry corresponds to a face in the topology, each curve in the geometry corresponds to an edge in the topology and each position in the geometry corresponds to a vertex in the topology (Figure 4-1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Silva et al. to incorporate the teachings of Kalay to obtain the invention as specified in claims 16 and 18 because Kalay discloses in detail the topology, the geometry, and their relationship as suggested by Silva et al. (Silva, column 11, lines 16-19).

Applicants' Arguments

13. Applicants argue the following:

(1) "Applicant acknowledges that the Examiner's suggested notation reflects more prevalent usage, and has amended the specification herein to conform to the Examiner's suggestion" (page 11, paragraph 1, paper # 18).

(2) "the textual description of transformation function f and composed functions sfl and cfl are intended to describe standard x,y,z coordinate systems in 3-dimensional computer

graphics models and are not intended to represent matrix operations" (page 11, paragraph 2, paper # 18).

(3) "Because Silva only discloses transforming points directly, Silva does not disclose or even suggest performing function composition with curve or surface functions" (page 12, paper # 18).

(4) "combining Silva with Kalay teaches away from the present invention of using function composition to perform a transformation on a model using curve and surface functions" (page 13, paper # 18).

Response to Arguments

14. Applicants' arguments have been fully considered.

14-1. Applicants' argument (1) is persuasive. The rejection in paper # 11 of the contradictory definition regarding the domain of composed functions has been withdrawn.

14-2. Applicants' argument (2) is not persuasive because the transformation function f as defined in line 18 of page 9 in the substitute specification makes f•s1 and f•c1 inconsistent with the example shown in lines 8-9 of page 9.

14-3. Applicants' arguments (3) and (4) are not persuasive. First, it is well known that parametric models represent models as sets of procedures having input parameters such as dimension values and output geometry. The procedure for constructing the product may be viewed as a sequence of assignments to model variables, for example, radius, as a function of input parameters for the underlying parametric equations. In other words, the underlying parametric equations representing curves or surfaces are implicitly existed in a parametric

definition. For example, in column 4, lines 51-53, Silva et al. disclose, "The tube master 190 includes a parametric definition of a tube, e.g. a tube has an inner radius, an outer radius and a height". A tube with assigned parameter values is shown in Figure 3 indicating at least one of the underlying parametric equations is an equation of circle.

Second, in column 6, lines 59-62, Silva et al. disclose, "Modifiers can be stacked together so that the output of one modifier is fed into the input of another modifier. This provides a user with a virtually endless number of combination". Although Silva et al. have not used "function composition" explicitly; the function of the modifier stack 280 does meet the Applicants' definition of "function composition" as described in lines 3-5 of page 9 in the substitute specification.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

Reference to Han et al., U.S. Patent 6,392,645 B1 issued May 21, 2002, and filed March 15, 1999, is cited as disclosing a three dimensional geometric modeling system.

Reference to Shapiro et al., U.S. Patent 6,718,291 B1 issued April 6, 2004, and filed June 22, 2000, is cited as disclosing a mesh-free method for modeling and analysis by representing geometric models by implicit mathematical functions.

16. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Herng-der Day whose telephone number is (703) 305-5269. The Examiner can normally be reached on 9:00 - 17:30.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin J Teska can be reached on (703) 305-9704. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Herng-der Day
June 14, 2004

KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER

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